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THE IMPACT OF AGRICULTURAL GROWTH ON EMPLOYMENT IN EGYPT: A THREE-SECTOR MODEL

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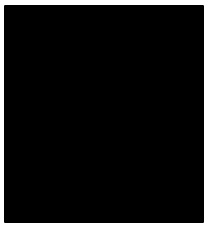

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LIST OF ACRONYMS

APRP	Agricultural Policy Reform Program
ARC	Agricultural Research Center
CAPMAS	Central Agency for Public Mobilization and Statistics
GDP	Gross Domestic Product
IFPRI	International Food Policy Research Institute
MVE	Monitoring Verification and Evaluation Unit
USAID	United States Agency for International Development

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EXECUTIVE SUMMARY

A major portion of the Egyptian labor force has low income and a low wage rate, both caused by slow growth in the demand for labor in the context of rapid growth in the supply of labor. The latter is the consequence of the high birth rates of a decade or more ago. The former is the subject of this paper. The returns to labor, when averaged over the total labor force, are very low. How to accelerate the growth in demand for labor sufficiently to solve that problem is the most pressing issue facing the Egyptian political and economic system. The bulk of that low-income labor is in the labor-intensive, rural non-farm sector.

A now large literature points to accelerated growth in the agricultural sector as the basic determinant of increased demand for labor and hence in reduced poverty of the labor class. The most recent literature, from Martin Ravallion and his colleagues at the World Bank and Peter Timmer (then at Harvard University) and his colleagues, shows that it is rural and agricultural growth, not urban or industrial growth, that reduces poverty and increases demand for labor. That literature also shows a three- to four-year lag before the full benefits of agricultural growth show up in poverty decline and an absence of poverty decline when agricultural land is held in large holdings, particularly by absentee landlords.

These findings are consistent with agriculture's driving the demand for labor through its demand for goods and services produced in the large, labor-intensive, rural non-farm sector. There is a large literature, in which the work of Carl Liedholm is prominent, that shows the rural non-farm sector as dependent on agriculture as the driving force for its demand, and that the goods and services produced by that sector are largely non-tradable. The latter means that they are not salable in the international market because of low quality and high transaction costs. They depend on increased domestic demand for their growth. Gavian et al. provide considerable detail on these relations from a recently conducted study of small and household-based firms and rural employment and consumption (MVE Special Study no. 5).

There is also an employment-intensive, non-tradable sector in urban areas that is driven by demand from growth in the urban tradable sector. However the urban non-tradable sector is only half the size of the rural non-tradable sector.

A Three-Sector Model of Growth – Focus on the Relation Between the Structure of Growth and Employment

A three-sector model is constructed that allows focus on the key elements of the relation between the structure of growth and change in the demand for, and hence in the income of, low-income labor. The model is highly simplified in order to focus on key relationships.

The model presented has three sectors: Agriculture (which is tradable), Urban Tradable (the bulk of large-scale urban enterprise), and Non-Tradable. The first two sectors can sell in international markets and hence do not face declining prices as output is increased. The third sector depends entirely on domestic demand. Employment is largely in the non-tradable sector, although its share of GDP is modest. Thus, GDP growth depends largely on the ability to expand production in the tradable sectors, while employment growth depends largely on increases in (domestic) demand for non-tradables.

The factor shares (shares of income to the factors of production, land, labor, and capital) are very different in the three sectors. The consumption patterns of the recipients of income from the various factors of production are also very different. The recipients of income from labor and from land spend heavily on non-tradables, while the recipients of capital income, including human capital, spend entirely on tradables. The dominant share of income in the urban tradable sector is to capital. Therefore, growth of the urban tradable sector has only a modest impact on the employment-dominant, non-tradable sector. Agriculture, in contrast, has factor shares largely to farmers with income from land and labor, who spend heavily in the non-tradable sector.

Egyptian Data for the Model

The most important numbers for the model are those for employment. The CAPMAS 1998 labor force survey provides detailed data that facilitate division of the labor force into the sectors described. Those data show 23 percent of the labor force in agriculture, 15 percent in urban tradables, and 62 percent in non–tradables, of which 42 percentage points are in rural non-tradables and 20 percentage points in urban non-tradables. The rural non-tradable sector dominates employment.

National income statistics are not tabulated according to tradable and non-tradable sectors, or even rural and urban, hence it was much more difficult to make that division. A firm figure is available for agriculture value-added as a percent of total GDP. That is 17 percent. It is estimated from the expenditure patterns of rural people that 18 percent of GDP is produced in the rural non-farm sector. The urban sector was divided, largely on the basis of size of enterprise, with 57 percent of GDP in the tradable sector and 8 percent in the non-tradable. Note that the rural sector has nearly twice as high a share of employment as GDP, while the opposite relation holds in the urban sector.

Employment and GDP Shares, Egypt, 1998

(percent)

Sector	Employment	GDP
Rural		
Agriculture	23	17
Non-Tradable	42	18
Subtotal	(65)	(35)
Urban		
Tradable	15	57
Non-Tradable	20	8
Subtotal	(35)	(65)
TOTAL	100	100

Factor shares to capital and labor for each sector are derived directly from the proportions of labor force and GDP in each of the sectors. For agriculture, the capital share also includes the share to land, and so a division between the two must be made. Data from farm surveys for Egypt show the proportion of total costs to land. That averages roughly 35 percent. Thus, the factor shares for agriculture are 55 percent labor, 10 percent capital, and 35 percent land; urban tradable is 90 percent capital and 10 percent labor; and non-tradable is 100 percent labor. (The low capital component is assumed to be a direct embodiment of labor and therefore not treated separately from labor.)

The rate of growth of the two tradable sectors is determined exogenously by the rate of growth in the supply of the three factors of production and by the rate of technological change. Land and labor grow at a low fixed rate, the one (land) determined by government policy with respect to New Lands (taken as an additional one percent per year) and the other (labor) by past population growth rates (taken as 2.8 percent per year). As stated, the non-tradable sector's growth is determined by the rate of growth of demand, with the underlying force coming from growth in income in the two tradable sectors (with their very different factor proportions and consumption functions).

Since land is a major factor in agricultural production and is very limited in the extent to which it can be increased, it follows that technological change is the primary source of agricultural growth. Capital dominates the urban tradable sector and is the primary determinant of its growth rate.

The income elasticity of demand by farmers and laborers for the non-tradable sector is extrapolated from IFPRI survey data for Egypt. The demand of farmers for the goods and services produced by the non-tradable sector is elastic (1.5). The price elasticity is also determined to be elastic. A survey of small- and medium-sized firms and of household-based enterprises, with emphasis on the rural areas (Gavian et al.), corroborates 1) that growth in the demand for the goods and services of these enterprises comes from agriculture and is not significantly driven by urban income, 2) that the rural non-farm sector is very labor-intensive, using little capital, and 3) that the rural non-farm sector can readily respond to increased demand by increasing production.

Results from the Model – The Determinants of Demand for Labor and the Wage Rate

With high balanced growth, that is, both the agricultural and urban tradable sectors growing quickly, the demand for labor grows rapidly. If the source of rapid urban tradable growth is maintained at a high level, but the basic source of agricultural growth is eliminated, then agriculture does not grow at all. The demand for labor grows hardly faster than the labor force growth. Wage rates and the income of the labor class hardly rise at all. In contrast, *if the basic source of urban tradable growth is eliminated but agricultural growth is maintained, the urban tradable sector grows slowly, the GDP growth rate slows markedly, but the demand for labor slows very little. The purpose of this comparison is to show explicitly that it is agricultural growth that drives the demand for labor.*

Growth Rates, Different Scenarios

(percent)

Scenario	Agriculture	Urban Tradable	Non-Tradable	Wages	GDP
Base	5.6	9.1	5.2	2.7	7.5
II	-0.2	9.9	3.8	0.2	6.6
III	7.0	3.8	5.4	2.2	4.7

Concisely, the structure of growth makes a tremendous difference. When agriculture grows rapidly, demand for labor grows rapidly; when urban tradables grow rapidly, GDP grows rapidly. A structure weighted towards agriculture is weighted towards benefits to labor; a structure weighted towards urban tradables is weighted towards fast growth in GDP. It is agricultural growth that increases the income of labor. It does so through its impact on the demand for the goods and services of the rural non-tradable sector.

It should also be noted that agriculture and urban tradables grow in quite different ways. They are not fully competitive for resources. Urban tradables grow primarily through increase in the capital stock. Rapid growth in this sector may well require creating a favorable environment for foreign direct investment. Agriculture grows largely through technological change. Rapid growth of agriculture requires investment in research and extension. It should also be noted that in a model of this type, factors of production move readily across the economy in response to relative prices, and goods move readily into the export market when domestic production grows faster than domestic demand. In practice, policies must be in place to not impede, and indeed to positively facilitate, those flows.

1. INTRODUCTION

Increasing employment rapidly enough to absorb labor force growth, large-scale labor redundancy in the public sector, and substantial unemployed and underemployed labor is generally seen as the most critical economic problem facing Egypt. However that problem is defined, the solution lies with rapid acceleration in growth in the demand for labor. As will be shown below, 62 percent of the labor force is in the employment intensive, small scale, non-tradable sector. Two-thirds of those are in the rural non-tradable sector. Another 23 percent is in agriculture. Only 15 percent of the labor force is in the urban tradable sector.

No achievable growth rate in the urban tradable sector can solve the employment problem in the short to intermediate run. Indeed, it would seem impossible to solve the employment problem in the near term without substantial growth in the employment dominant non-tradable sector. By definition, demand for increased output in the non-tradable sector must come from increased domestic expenditure. As will be shown, agriculture is potentially the dominant source of such expenditure. Thus, it is agriculture and non-tradables that must solve this important problem in the short and intermediate term. This paper provides a three-sector model that clarifies the processes by which that may occur.

The agricultural growth rate can accelerate substantially as agricultural technology advances, policies improve, and institutions develop. The subject of this paper is the differential impact of acceleration in the agricultural growth rate on GDP and the demand for labor. The paper first describes the employment and GDP composition of the urban and rural sectors and the tradable and non-tradable sub-sectors within each. These are then summed into two tradable sectors, agriculture and urban, and one non-tradable sector. The paper then presents data on the quite different factor shares in the production of each sector as well as the very different average and marginal expenditure patterns of the recipients of the various factor shares. Focus is on differences in expenditure on the non-tradable sector. Those are the data required to analyze the differential impacts on the demand for labor of growth in the agricultural and urban tradable sectors.

Economic development is well described as a process of transforming an economy from largely non-tradable to largely tradable. In the early stages of the transformation, the bulk of the poor are in the non-tradable sector. Thus, poverty reduction, demand for labor, and income distribution are largely determined by growth in domestic demand for the output of that sector. It will be shown that agriculture is the primary source of such growth in demand and that the urban tradable sector is far less important in that respect.

The model presented is based on neo-classical assumptions. That is that markets work and provide optimal allocation of resources, that all resources are fully employed, that knowledge is perfect, and that adjustments to change in prices and resource quantity are instantaneous. It should be noted that while the principal economic problem of Egypt is conveniently described as one of unemployment, the reality is somewhat different. In fact, only a small percentage of the labor force is actually unemployed. The problem is actually a more general one of low income of those whose income comes primarily from labor, particularly in occupations that demand only unskilled or semi skilled labor. The labor market will tend to pay a higher wage in the more capital-intensive urban tradable sector than in the non-tradable sector partly because of higher skills demanded and partly to ensure stability of the labor force in view of high cost of capital and the consequent high cost of idle capital.

Nevertheless, the wage levels in the various sectors are linked. Thus, the economic problem of low income of the laboring class is one of increasing the demand for labor more rapidly than the supply with a consequent increase in the wage rate. Increase in the wage rate measures the improvement in the incomes of laboring people.

While numerous studies show that growth reduces poverty, a substantial subset of such studies show that the structure of growth matters very much to poverty reduction. Recently there has been an international focus on absolute poverty. However, lifting large numbers of people out of poverty will occur by increasing the real incomes of those who earn their income largely from their labor. Thus reducing poverty is roughly synonymous with increasing the multiplicand of amount of employment and the wage rate.

Early analysis by Ahluwalia (1978), and by Mellor and Desai (1985) shows that fluctuations in poverty in India were largely explained by fluctuations in the agricultural growth rate. Recent work by Timmer and his colleagues and Ravallion and his colleagues analyze the relation between sectoral growth rates and poverty reduction over time and across geographic regions. Timmer (1997) shows that 85 percent of poverty reduction is attributable to agricultural growth. Ravallion and Datt (1996) show that rural growth and agricultural growth have a far greater impact on poverty reduction than does urban, industrial, or large-scale tertiary growth. These same studies show that there is a lag in reduction of poverty from agricultural growth and that the impact on poverty of agricultural growth in the context of highly skewed land distribution is weak. The model presented here reconciles those findings.

2. MODEL CONCEPTUALIZATION

A three-sector model has been constructed that demonstrates a quite different impact on the employment intensive non-tradable sector of growth in the agricultural tradable and the urban tradable sectors. Demand for output from the two tradable sectors is not constrained by national income. They can export what is not consumed domestically. For those sectors, production is determined by the factors of production, land, labor, and capital, and by technological change. The third, non-tradable sector, has growth constrained by domestic demand from expenditure by the two tradable sectors. It cannot export, because of low quality and high transaction costs. Since the bulk of employment is in the non-tradable sector, the determinants of demand for the output of that sector is the prime determinant of growth in the demand for labor, of wage rates, and, hence, of income of the laboring class.

Production functions for the three sectors are very different.

- Land is important to agricultural production, and because of constraint in its supply, technological change is a major source of agricultural growth. Labor is also important.

- Urban tradables do not use land, capital is dominant, and labor is of modest importance.

- The non-tradable sector is simplified to use only labor in its production.

- Income to labor, all labor in the three sectors, is the primary source of demand for the non-tradable sector.

- Income to land largely accrues to farmers of modest income and that income is spent the same as income to labor. One could assume that land income had a quite different expenditure pattern to that of labor. For example, where it accrues to absentee landlords it could be assumed to be spent like returns to capital. That would be consistent with data that show that when land is highly unequally distributed that agricultural growth has little impact on poverty (Timmer, 1997).

- Income to capital is assumed to be entirely spent on tradables.

- Not all wage payments are considered as a return to labor. That portion of wage payments in excess of that of farm workers is classified as capital (human capital) and is spent on tradables.

Thus, the relevance of the model hinges on a large, dominantly rural, non-tradable sector that has a high factor share to labor and represents a major share of total employment; a tradable agriculture sector that spends a high proportion of its income on non-tradables; and, a tradable urban sector that has a low factor share to labor that is in turn the only source of its expenditure on non-tradables.

3. THE DATA SET FOR EGYPT

Data are needed for the initial division of employment and GDP among the three sectors, factor shares for the three sectors, and, expenditure and price elasticities for non-tradables from the income of labor and land.

3.1 Employment

The CAPMAS 1998 Labor Force Survey categorized the labor force as urban and rural and within each by farm, establishment, non-establishment, and government, and other. Rural includes large villages (effectively good sized market towns) and their satellites but not district headquarter towns, other towns of that size, and metropolitan centers. For the purposes of this paper it is an excellent definition, since the larger villages are the main trading centers for rural areas and are relatively self contained except for agricultural sales out of the village complex and purchases by merchants of goods from outside for local sales.

Table 1 presents the CAPMAS data in the first column of numbers and then divides the sub-sectors into non-tradable and tradable groupings. Tradable refers to sub-sectors that can at the margin export. It does not mean that everything in the sub-sector is exported, only that incremental production can be exported at the international price. In practice this means that in anticipation of production growing faster than the domestic market active steps to ensure that international quality and other standards are met. That requires entrepreneurial action and institutional development. The paper assumes that such steps will be taken. In this context, all of agriculture is seen as tradable, but the caveats implied in the preceding are especially relevant to agricultural sub-sectors such as horticulture and livestock. To some extent the condition of tradability can be met by import displacement, as for example in the case of maize. In this spirit it is assumed, per Table 1, that all enterprises of more than 50 employees, all public sector enterprises, and government administration in urban areas are tradable. Government administration is taken as tradable on the basis of its complementary relation to tradable enterprise. This seems more logical than grouping it as non-tradable. Only four percent of the labor force falls in that category.

Non-tradable are of course goods and services that for quality and transfer cost reasons are not exportable. All the rural non-farm sector is so classified. That sector includes a massive 43 percent of the total labor force. From the survey data analyzed by Gavian et. al., none of the rural establishment firms (those with a fixed place of business) employed more than three persons. The sample size was adequate for representation of larger firms if they existed in greater than negligible numbers. It is notable that essentially all of their output is sold in the village structure. A high proportion of all enterprise in rural areas is service.

The classification of rural enterprise seems fully justified. In the urban sector it could be argued that the division between tradable and non-tradable establishments should have been set at somewhat lower than 50 employees. Lowering that dividing point would add at most a percentage point or two to the tradable sector from the non-tradable sector.

The labor force data are summarized in Table 2, which also includes the data on GDP and factor shares to be discussed in succeeding sections.

Table 1: Labor Force Data (CAPMAS) and Subdivision into Four Sectors, Egypt, 1998

Sector	Labor Force (00s)	Total	Non-Tradable	Tradable
Rural		**Percent**		
Farmers	47232	23		23
Government	24659	12	12	
Establishments	12059	6	6	
Outside Establishments	54119	25	25	
Other	519	*	*	
Subtotal	138588	66	43	23
Urban				
Government	30790	15		
Public Enterprises	(12360)	(6)		6
Public Services	(10270)	(5)	5	
Administration	(8160)	(4)		4
Establishments	24571	12		
Over 50 Employees	(10193)	(5)		5
Under 50 Employees	(14378)	(7)	7	
Outside Establishments	14233	7	7	
Other	883			
Subtotal	70477	34	19	15
Total	209065	100	62	38

Notes and Sources:

1. All data in first column of numbers, except those in parentheses, are directly from the CAPMAS 1998 Labor Force Sample Survey.
2. Urban Government is divided as follows: Public Enterprise as reported in *Public Enterprise Statistics.* Public Services is intended to represent the same set of public services, in large part education and health, as provided in rural areas and at the same per capita level, and is therefore calculated at 42 percent of the rural number for government services. The government administration number is the residual for government.
3. Establishments are divided into those over 50 and those under 50 employees, according to surveys of manufacturing.
4. Although 1.6 percent of the labor force is comprised of farmers in urban areas, they are summed into the rural area, since the impact of all agriculture is to be measured.
5. Other is rounded to zero, since it is in each case less than 0.5 percent.

3.2 GDP

However important it may be for employment analysis, national income data are not kept according to tradable and non-tradable sectors, or even by size of firm. Thus, segmenting in this manner requires considerable extrapolation from existing data. The data for GDP are much less tractable for division according to the purposes of this paper than the employment

data, which fit very well and therefore are quite reliable for this purpose. One of the purposes of this paper is to show how important to both economic growth and employment growth is knowledge of such data and thus to encourage classification of data along those lines.

National income accounts (CAPMAS, 2001) provide the value added for agriculture, at 17 percent of total GDP. The following estimating procure provides a good estimate of the proportion of GDP in the rural non-farm sector. IFPRI Rural Household survey data for Egypt (Bouis et. al. 1999) show 43 percent of farmer's consumption expenditure on non-food items. We assume that 90 percent of that spent is locally (consistent with Gavian et. al. 2002). It is further assumed that 75 percent of output is marketed (slightly less than the figure in Gavian et. al.); that the marketing margin is 23 percent and that half of the average 23 percent marketing margin occurs in the rural non-farm sector. An arbitrary one percent of income is assumed as spent on local capital expenditure such as major housing additions or farm improvements in irrigation. Consumer expenditure surveys do not include capital expenditure and so there are no data for this important item. The sum of these items totals 9 percent of GDP spent in the rural non-tradable sector. With a multiplier of two (consistent with a marginal propensity to spend within the rural non-farm sector of 0.5, which is roughly consistent with the IFPRI farm expenditure data), that comes to 18 percent of national GDP in the rural non-tradable sector. Those data are consistent with data by Delgado et al. (1998) for Africa, and Hazell and Roell (1983) for Malaysia and Nigeria.

The remaining 65 percent of GDP is urban and is to be divided between the urban tradable and non-tradable sectors. A calculation for the urban tradable sector is made similar to that for the rural tradable sector as follows: The 8 percent of GDP in the urban non-tradable sector is consistent with 10 percent of output paid to labor (see the factor share discussion), an average propensity of labor to spend on urban non-tradables of 50 percent (roughly the same as farmers, plus one percent of the share of capital spent on non-tradables, primarily construction by small scale suppliers and a multiplier of two.) That calculation states 8 percent of the urban GDP in they non-tradable sector and therefore 57 percent in the urban tradable sector.

The data are summarized into three sectors at the bottom of Table 2. It is notable that agriculture has similar proportions of GDP and employment; urban tradable has nearly four times as high a share of GDP as of employment; while the non-tradable sector has nearly 2 ½ as times as high a share of employment as of GDP. It is important to note that these numbers do not reflect differences in wage rates. They reflect the differences in capital per worker.

3.3 Factor Shares

The relative shares to labor and capital can be calculated from the relationship between employment proportion and GDP proportion, shown in Table 2. Gavian et al. (2002) show a negligible amount of capital in non-establishment rural firms, and only a few thousand Pounds per worker in establishment firms. Consistent with Liedholm and Meade (1987) we assume that the bulk of that capital is a direct embodiment of labor and therefore is not separated from labor as a factor of production. That leaves the factor share in non-tradables as entirely to labor. The factor shares for the other two sectors are relative to those for non-tradables. Those shares are shown in table 2.

Table 2: Employment and GDP Shares and Factor Shares, Egypt, 1998

(percent)

Sector	Employment Proportion	GDP Proportion		Labor Share	Capital Share	Land Share	Total Share
Rural							
Agriculture	23	17		55	10	35	100
Non-tradable	43	18		100	0	0	100
Subtotal	66	35					
Urban							
Tradable	15	57		10	90	0	100
Non-tradable	19	8		100	0	0	100
Subtotal	34	65					
Total	100	100					
Agriculture	23	17		55	10	35	100
Urban Tradable	15	57		10	90	0	100
Non-tradable	62	26		100	0	0	100
Total	100	100					

Sources: Labor force data from Table 1; GDP data calculated from national income statistics; factor shares are calculated from the employment and GDP shares, with non-tradable as the base.

In the case of agriculture, the land and capital shares have to be separated. The sum of the two as calculated above is 45 percent. The factor share for land is drawn from (Morsy, 2002). They are averages for several crops, and approximate 35 percent. Egyptian agricultural land only has value when irrigated. Thus, the land factor share covers land and associated water. The Capital factor share at 10 percent is the residual between the 45 percent calculated for the two factors and the calculated share to land of 35 percent. Land is of course an important factor of production in agriculture and has a profound effect on both the sources of growth in agriculture and the expenditure patterns of agricultural income. Thus the factor shares in agriculture are 55 percent labor, 10 percent capital, and 35 percent land. By summing the land and capital factor shares these results are the same as those arrived at from the employment and GDP proportions.

The factor shares for non-tradables of 90 to capital and 10 percent to labor may appear low with respect to labor. First, it should be noted that factor shares are quite different to physical capita labor ratios. Factor shares reflect the low wage rates of labor. Second, while some manufacturing may have much higher factor shares to labor, support industries such as electric power have much lower than average factor shares. Third, wage rates in the urban tradable sector are on the order of twice those of agricultural labor. That difference reflects human capital, which is part of the capital factor share not the labor factor share.

3.4 Expenditures on Non-Tradables

The core of this model is expansion of the non-tradable sector, which dominates employment. By definition, expansion of the non-tradable sector depends on increased incomes of those who spend on non-tradables. The model has three sources of increased expenditure on the non-tradable sector: farmer income, comprised of the factor shares to labor and land in agriculture; labor income in the tradable sector, which is small; and, labor income in the non-tradable sector, which can expand only if demand increases from the other two sources. On the latter point, although it seems difficult to grasp, the non-tradable sector cannot expand by spending on itself. There must be an outside source of funds spent on the sector. Then, from that increase in income, a substantial portion will be spent within the sector. That latter spending provides the multiplier on the outside source of spending. Thus, when in Gavian et al. (2002) they report that the non-tradable sector spends more in the non-tradable sector than agriculture, that is of course correct. However, it is larger because the sector is larger than agriculture because of the elastic demand for its product from the agricultural sector. But, it is agriculture that provides the initial impetus for growth of the sector. Gavian et al. is simply reporting the statics of the situation.

It is assumed that all income to capital, in all sectors, including human capital, is spent only on tradable goods and services. Human capital is substantial in the urban tradable sector. As laborers wage rates rise, and employment increases, expenditure on non-tradables increases, but not as return to human capital rises. That latter expenditure is allocated to tradable goods and services. Thus, all people consume non –tradables, and as wage rates rise they increase their consumption of non-tradables, even those with large components of human capital in their total income. But, those with human capital income increase expenditure on non-tradables only in proportion to the rise in the base income attributable to the pure labor part of their income. Farmers receive income from their labor and from land. It is assumed that both sources of income are spent in the same manner. A different assumption about land income could be made as explained at the beginning of the paper.

Just as GDP data do not facilitate segregating the labor-intensive non-tradable sector, similarly consumer expenditure data do not facilitate the same segregation. As the sectors are categorized in this analysis, farmers are the most important source of consumer expenditures for non-tradables. Rural survey data for Egypt, reported by Haddad and Ahmed (1999), and Bouis et al. (1999) allow a first approximation of those expenditures. Forty-three percent of rural expenditures is for non-food goods and services and the income elasticity of that expenditure is 1.8 (Bouis et al., 1999). In the modeling exercise, that elasticity is conservatively rounded down to 1.5. As shown below, the village complex with its market town is substantially self-contained so essentially all of that expenditure is in the village and hence in the non-tradable sector (Gavian et al., 2002.). We do not have an empirical estimate of the income elasticity of demand. We are assuming a low cross price elasticitiy between tradables and non-tradables (0.20), and based on that, the own price elasticity for non-tradables is –1.25.

It is assumed that urban laborers have similar expenditure patterns with respect to urban non-tradables. To the extent that urban laborers spend relatively more on tradables, that is balanced by expenditures from human and other forms of capital income on non-tradables. Again, a multiplier of two is assumed, consistent with the expenditure data.

There are transfer payments into and out of agriculture. Remittances, both from outside the country and from urban areas comprise about six percent of rural income (Adams, 1999.) Rents paid to absentee landowners are similar in size. Twenty percent of farm land is rented or a mixture of rented and owned (Morsy, 2002). Rent of one-third of the crop, consistent with previously cited data, would roughly balance the six-percent inflow from remittances. Hence these flows are ignored in the model.

3.5 The Village as a Self-Contained Unit

One of the most important assumptions in this analysis of employment growth in the immense, labor-intensive rural non-farm sector is the high (1.5) income elasticity of demand for rural non-farm goods and services. That high elasticity makes the sector dynamic – it grows faster than agriculture. An early literature (e.g. Hymer a Resnick 1967) built on the opposite assumption that as farmers incomes rose they would be attracted to spend outside the rural areas on largely tradable commodities. The rural non-tradables sector would quickly perish. If this were true the employment problem would be virtually intractable since so much of base employment is in the rural non-tradable sector. The reality is that rural non –farm providers of goods and services adapt to changing circumstances, including rising incomes. All types of rural workers increase the quality of what they produce and adapt it to more modern tastes, the nature of services changes, shops carry a quite different range of goods.

Survey data for Egypt show that at middle-income country levels of rural income and in close proximity to urban influences, the rural area, with its growing market town and satellite villages remains largely self-contained (Gavian et al., 2002). Farmers spend practically all of their income in the rural areas, rural non-farm businesses purchase the bulk of their inputs in the rural area, essentially all of their customers come from the rural area, and all of their work force comes from the rural area. Farmers spend little of their income in urban areas and urban people hardly buy at all in the rural areas. As a general observation, throughout low and middle-income countries where agriculture prospers, whether it be the Punjab of India or the small-holder tea areas of Kenya, the rural market town is a vibrant expanding place (Mellor, 1992). Where agriculture is stagnant the market towns are stagnant (Mellor, 1992).

4. MODEL PRESENTATION

4.1 Sectors

The economy comprises three sectors namely, Tradable Agriculture Sector, Non-Tradable Sector and Tradable Urban Sector. It is a small economy, which takes international prices as given and does not influence them.

The production in the Tradable Agricultural Sector is a Cobb-Douglas Production function with three inputs of production as follows:

$$A = t_a K_a^{\alpha} L_a^{\beta} Z^{\gamma} \quad (1)$$

Where A is the output of the sector; Z, K_a and L_a are, respectively, land, capital and labor inputs; and α, β and γ are parameters. The parameter t_a measures technological change in the agricultural sector.

The production in the Tradable Industries Sector is a Cobb-Douglas Production function with two inputs of production as follows:

$$Q = t_q K_q^{\varphi} L_q^{1-\varphi} \quad (2)$$

Where Q is the output of the sector; K_q and L_q are respectively, capital and labor inputs; and ? is a parameter. t_q measures the technological change.

The output (NT) in the Non-Tradable Sector is assumed to be proportional to the labor input as follows

$$NT = \delta L_{nt} \quad (3)$$

Where, L_{nt} is the labor input and ? is a parameter.

K and L are respectively the total capital and the total labor inputs exogenously given as follows:

$$L = L_a + L_q + L_{nt} \text{ and } K = K_a + K_q \quad (4)$$

4.2 Market Equilibrium Conditions

The price of agricultural and industrial goods is determined in the international market. We assume that the four domestic markets in the economy are competitive and are as follows:

The labor market equilibrium is determined by differentiating Equations (1), (2) and (3) by L_a, L_q and L_{nt}, and equating the marginal products of labor, respectively, as follows:

$$? \; P_a K_a^{\alpha} t_a^{(\beta-1)} Z^{\gamma} L^{(\beta-1)} = P_{nt} \delta = W \quad (5)$$

and

$$\beta P_a K_a^{\alpha} r_a^{(\beta-1)} Z^{\gamma} L^{(\beta-1)} = (1-\varphi) P_q K_q^{\varphi} r_q^{-\varphi} L^{-\varphi} \quad (6)$$

where $r_a = L_a/L$, $r_q = L_q/L$,, P_a = price of agricultural goods, P_q = price of industrial good and P_{nt} = price of non-tradable.

Equation (5) shows that the wage rate is directly proportional to the price of non-tradables.

The capital market equilibrium is determined by differentiating Equations (1) and (3), and equating the marginal products of capital as follows:

$$\alpha P_a K_a^{\alpha-1} r_a^{\beta} Z^{\gamma} L^{\beta} = \varphi P_q K_q^{\varphi-1} r_q^{1-\varphi} L^{1-\varphi} \quad (7)$$

The equilibrium in the non-tradable market is given by equating the supply of non-tradable goods and the demand for it by labor. Only laborers and farmers consume non-tradable goods. Note that in the agricultural sector the income of laborers is the sum of return from labor as well as land.

$NT = C_{nt} (L_a + L_q + L_{nt}) + C_{nt}(\gamma/\beta)\eta L_a = \delta L_{nt}$, that is

$$? \; r_{nt} = C_{nt} [1+(\gamma/\beta)\eta r_a] \quad (8)$$

where

$r_{nt} = L_{nt}/L$, and C^{nt} is the consumption per laborer for non-tradable goods and it is a function of income and prices as follows:

$(\delta C_{nt}/\delta W)(W/C_{nt}) = \eta$ = income elasticity of demand for non-tradable goods and
$(\delta C_{nt}/\delta P_{nt})(P_{nt}/C_{nt}) = \varepsilon$ = price elasticity of demand for non-tradable goods.

Note also that the second term in the right hand side of (8) is the additional consumption of non-tradables by the agricultural laborers (peasants) from the income from land.

As said above, the market for tradable agricultural and industrial goods is internationally determined where the P_a and P_q are exogenously determined.

4.3 Comparative Statics

We will now use the above model to study the effects of various exogenous variables like the total capital stock and labor force, technological changes in the agriculture, industry and non-tradables on endogenous variables such as K_a, K_q, r_a, r_q, r_{nt}, P_{nt} and W. In order to do this we logarithmically differentiate equations (5), (6), (7) and (8) with various exogenous variables. Differentiating these equations with respect to the technological change in the agricultural sector t_a and after rearranging the terms we get:

$$\alpha(\delta K_a/\delta t_a)(t_a/K_a)+(\beta-1)(\delta r_a/\delta t_a)(t_a/r_a) - (\delta P_{nt}/\delta t_a)(t_a/P_{nt}) = -1 \quad (9)$$

$$[\alpha + \varphi(K_a/K_q)](\delta K_a/\delta t_a)(t_a/K_a) + (\beta-1)(\delta r_a/\delta t_a)(t_a/r_a) + \varphi(\delta r_q/\delta t_a)(t_a/r_a) = -1 \quad (10)$$

$$[-(1-\alpha) - (1- \varphi)(K_a/K_q)](\delta K_a/\delta t_a)(t_a/K_a) + \beta(\delta r_a/\delta t_a)(t_a/r_a) - (1- \varphi)(\delta r_q/\delta t_a)(t_a/r_a) = -1 \quad (11)$$

$$-(r_a/r_{nt})(\delta r_a/\delta t_a)(t_a/r_a) - (r_q/r_{nt})(\delta r_q/\delta t_a)(t_a/r_a) - (\eta + \varepsilon)(\delta P_{nt}/\delta t_a)(t_a/P_{nt}) = 0 \quad (12)$$

The changes in K_q, W and r_{nt} can be found by using the following equations:

$$(\delta K_q/\delta t_a)(t_a/K_q) = - (\delta K_a/\delta t_a)(t_a/K_a)(K_a/K_q) \quad (13)$$

$$(\delta W/\delta t_a)(t_a/W) = (\delta P_{nt}/\delta t_a)(t_a/P_{nt}) \quad (14)$$

$$\delta r_{nt}/\delta t_a = -\delta r_a/\delta t_a - \delta r_q/\delta t_a \quad (15)$$

The above equations can be solved simultaneously for the changes in 7 endogenous variables, namely, K_a, K_q, r_a, r_q, r_{nt}, W and P_{nt} and the values can be found in terms of the parameters and exogenous variables. The set of solutions are the percentage changes in the values of endogenous variables with respect to the percentage changes in different exogenous changes and are as follows:

Endogenous Variables **Solutions**

Where

$$\Delta = (\eta+\varepsilon)\varphi(1-\alpha-\beta)+(r_a/r_{nt})(\alpha-\varphi) - (r_q/r_{nt})[(1-\alpha-\beta)+((1-\varphi-\beta)(K_a/K_q)]$$

and

$$R= r_a(\gamma/\beta)\eta/[1+r_a(\gamma/\beta)\eta]$$

CHANGE IN CAPITAL STOCK (K)

K_a	$(r_q/r_{nt})(K/K_q)(-1+\varphi+\beta)/\Delta$
K_q	$K/K_q[1 - (r_q/r_{nt})(K_a/K_q)(-1+\varphi+\beta)/\Delta]$
r_a	$-(r_q/r_{nt})(\alpha-\varphi)/\Delta$
r_q	$[(\eta+\varepsilon)(1-\alpha-\beta)\varphi(K/K_q)+(R/r_{nt})(\alpha-\varphi)/\Delta$
P_{nt}&W	$(r_q/r_{nt})\varphi(-1+\alpha+\beta)(K/K_q)/\Delta$
r_{nt}	$(\eta+\varepsilon)\varphi(r_q/r_{nt})(K/K_q)(-1+\alpha+\beta)/\Delta$

TECHNOLOGICAL CHANGE IN AGRICULTURE (t_a)

K_a	$[(\eta+\varepsilon)\varphi - R/r_{nt} - r_q/r_{nt}]/\Delta$
K_q	$-[(\eta+\varepsilon)\varphi - r_a/r_{nt} - r_q/r_{nt}](K_a/K_q)/\Delta$
r_a	$[(\eta+\varepsilon)\varphi - (r_q/r_{nt})(K/K_q)]/\Delta$
r_q	$-[(\eta+\varepsilon)\varphi(K_a/K_q) - (R/r_{nt})(K/K_q)]/\Delta$
P_{nt}&W	$-\varphi[(R/r_{nt}) - (r_q/r_{nt})(K_a/K_q)]/\Delta$
r_{nt}	$-(\eta+\varepsilon)\varphi[(R/r_{nt}) - (r_q/r_{nt})(K_a/K_q)]/\Delta$

TECHNOLOGICAL CHANGE IN URBAN TRADABLES (t_q)

K_a	$[(\eta+\varepsilon)(\beta-1)+R/r_{nt} + r_q/r_{nt}]/\Delta$
K_q	$-[(\eta+\varepsilon)(\beta-1)+R/r_{nt} + r_q/r_{nt}](K_a/K_q)/\Delta$
r_a	$-(\eta+\varepsilon)\alpha + (r_q/r_{nt})(K/K_q)/\Delta$
r_q	$\{(\eta+\varepsilon)[(1-\alpha-\beta)-(\beta-1)(K_a/K_q)]-(R/r_{nt})(K/K_q)\}/\Delta$
P_{nt}& W	$[(R/r_q)\alpha-(r_q/r_{nt})(1-\alpha-\beta)$ $+(\beta-1)(K_a/K_q)(r_q/r_{nt})]/\Delta$
r_{nt}	$(\eta+\varepsilon)[\alpha(R/r_q) - (1-\alpha-\beta)(r_q/r_{nt}) +$ $(\beta-1)(K_a/K_q)(r_q/r_{nt})]/\Delta$

LABOR FORCE GROWTH (L)

K_a	$(1-\beta-\varphi)[(R/r_{nt}) + (r_q/r_{nt})]]/\Delta$
r_a	$[-(n+\varepsilon)\varphi(1-\alpha-\beta)+(r_q/r_{nt})(1-\alpha-\beta)(K/K_q)]/\Delta$
r_q	$[-(R/r_{nt})(1-\alpha-\beta)(K/K_q) + (\eta+\varepsilon)\varphi(1-\alpha-\beta)]/\Delta$
P_{nt} & W	$[(R/r_{nt})+(r_q/r_{nt})](1-\alpha-\beta)\varphi)/\Delta$
r_{nt}	$(n+\varepsilon)\varphi(1-\alpha-\beta)[(R/r_{nt})-(r_q/r_{nt})]/\Delta$

TECHNOLOGICAL CHANGE IN NON-TRADABLE SECTOR (d)

K_a	$(1-\beta-\varphi)(1+\varepsilon)/\Delta$
r_a	$(1+\varepsilon)(\alpha-\varphi)/\Delta$
r_q	$(1+\varepsilon)[(-1+\alpha+\beta)+(\beta+\varphi-1)(K/K_q)]/\Delta$
P_{nt}	$\{-(R/r_{nt})(\alpha-\varphi)+(r_q/r_{nt})[(1-\alpha-\beta)+(1-\varphi-\beta)(K_a/K_q)]$ $-(1-\eta)\varphi(-1+\alpha+\beta)\}/\Delta$
r_{nt}	$\{-(1+\varepsilon)(\alpha-\varphi)(r_q/r_{nt})-(R/r_{nt})(1+\varepsilon)[(-1+\alpha+\beta)+(\beta+\varphi-1)(K/K_q)]\}/\Delta$

$$W \qquad 1+\{-(R/r_{\pi})(\alpha-\varphi)+(r_q/r_{nt})[(1-\alpha-\beta)+(1-\varphi-\beta)(K_a/K_q)] -(1-\eta)\varphi(-1+\alpha+\beta)\}/\Delta$$

In order to study the impact of the exogenous variables on the endogenous variables over time we combine all of the changes in the exogenous variables. The period for such an analysis is one year. The growth rates of endogenous variables are percent per year and are derivatives with respect to time. They are estimated by plugging in the growth rates of the exogenous variables in the combined equations. In the analysis we assume that the parameters, such as the factor shares and the income and price elasticities, do not change.

4.4 Simulation Results

Five cases are presented using the foregoing model. The base case is to show the relationships from a high balanced growth rate, with rapid growth in both the agricultural sector and the urban tradable sector. All the other cases keep all the variables in the base case the same except for one that is specified.

- The second case shows the impact of radically slowing the agricultural growth rate by eliminating technological change in agriculture, all else kept the same.

- The third case radically slows the urban tradable sectors growth by reducing the capital formation rate to equal the labor force growth rate, all else the same.

- The fourth case expands the labor force faster than the labor force growth rate by five percentage points, allowing for the rapid absorption of an unemployed labor force.

- The fifth case incorporates technological change in the non-tradable sector at a four percent rate. Since labor is the only factor of production in the non-tradable sector, increasing productivity by 4 percent has the same effect on output as if the labor input into the sector increased by four percent. In effect that is analogous to expanding the labor supply only to the non-tradable sector. It is a variant of the fourth case.

The key outputs from the five cases are presented in table 3.

Table 3: Key Findings from Runs of the Model (Growth Rates)

(percent)

Case	GDP	Real Wage Rate	Agriculture	Urban Tradable	Non-Tradable
Base	7.5	2.7	5.6	9.1	5.2
II	6.6	0.2	-0.2	9.9	3.8
III	4.7	2.2	7.0	3.8	5.4
IV	9.6	3.1 (8.1)	9.9	8.2	12.5
V	11.7	3.8	3.2	15.0	9.9

It must be remembered that this is a neo-classical model with all resources fully employed and most important that resources move freely and instantly to equate the marginal returns.

To the extent that resources move less freely, the growth rate will be slowed. Thus, in all the following the growth rates are high.

4.4.1 Base Case – Rapid Balanced Growth

The base run provides assumptions that provide a balanced growth rate similar to what might be expected for a middle-income country like Egypt but with favorable development policies. It assumes a 1.0 percent rate of expansion of land (that is, irrigated area); 5.0 percent rate of technological change in agriculture; a two percent rate of technological change in urban tradable sector; an eight percent rate of growth of the capital stock; and labor force growth of 2.8 percent.

The growth rate of the irrigated area, net of losses including urbanization, is consistent with plans of the Government of Egypt and the actual experience of the past two decades. It is a very rapid rate of growth by the standards of most countries. The labor force growth is from CAPMAS (1998) and reflects the high population growth rates of two decades ago.

The 5.0 percent pace of technological change in agriculture is consistent with a 3.0 percent rate of increase of crop and animal yields and a 2.0 percent increase in productivity resulting from change in output composition towards higher value and productivity crops such as horticulture. Scientifically mature agricultures achieve a steady 1.5 percent rate of growth of yields; Egypt has yields that are 20 to 50 percent lower than those in the countries with the highest yields that have a comparable resource base, e.g., Israel for cotton, northern Australia for rice, and so on (FAO data base). The image of very high yields in Egyptian agriculture comes from comparisons with global or high-income country averages. Egypt however has extraordinarily productive agricultural resources and should be compared with successful countries with similar resources. Hence, an additional 1.5 percent growth rate for catch-up seems reasonable. Globalization and rising domestic incomes combine to increase the market for high value horticulture crops and technological advance in marketing as well as in production facilitate a shift that is productivity increasing.

The growth rate of 8.0 percent in the capital stock is consistent with a saving/investment rate of between 15 and 20 percent. That is at the low end of the range for fast growth middle income countries (Mellor 1972.) The 2.0 percent rate of technological change is arbitrarily chosen. Note that in urban tradable sector technological advance is embodied in fixed capital. Thus, there is a sharp contrast between tradable agriculture and tradable urban sectors in the way growth is achieved. One is through technological advance the other through capital input.

In the base case, all the growth rates fall within the ranges of fast growth middle income countries discussed in Mellor (1975).

With this structure of growth the real wage rate increases at a 2.7 percent rate. That rapid increase is despite the labor force growing at 2.8 percent and being absorbed in the work force. That is a measure of the rate of increase of the aggregate income of the laboring class – the poorest persons in the economy.

The rate of growth of the real wage rate can be interpreted in terms of increased employment in the context of unemployed labor that reflects an elasticity of supply of labor of 1. In that case, a 2.7-percent increase in wage rates depicted in the model presents itself as a 2.7-

percent increase in employment; on the labor force base of 21 million, that is 567,000. That increase is in addition to absorption of the labor force growth. Labor force growth at 2.8 percent adds 588,000 jobs on a base of the 21 million strong labor force. Thus, the total increase in employment in this fast-growth scenario is 1.115 million jobs. Without the technological change that generates the bulk of agricultural growth, only 42,000 jobs would be added in addition to the labor force growth. Total job formation is cut in half.

4.4.2 Scenario II - Slowing Agricultural Growth

If one keeps all parameters the same except to eliminate the primary source of growth for agriculture – that is to reduce technological change in agriculture to zero, then the rate of growth of GDP declines by only 11 percent; while the real wage rate growth virtually ceases, declining from 2.7 percent to a negligible 0.2 percent. This provides a plausible explanation of the empirical findings of Timmer (1997) and Ravallion and Datt (1996). Note that in this simulation the rate of growth of agriculture become negative as capital and labor are drawn to the industrial sector. That drives home the point that agricultural growth is dependent on technological change. Without it resources move to other sectors. What we see clearly is that if the sources of growth of agriculture are neglected, then the GDP growth rate slows only modestly but employment growth is virtually eliminated. A growth strategy that focuses only on the tradable urban sector can lead to moderately rapid growth of GDP, but the distribution of income will be highly inequitable.

4.4.3 Scenario III - Slowing Urban Tradable Growth

If one turns the situation around and keeps all assumptions as in the base case, but grow the capital stock at the same rate as the labor force (2.8 percent), then the growth rate of GDP drops sharply, by more then one-third, to 4.7 percent, but the rate of growth of real wages is a still quite rapid 2.2 percent. This is a strategy that focuses only on agriculture and neglects the tradable urban sector. In this scenario the tradable urban sector grows at only 3.8 percent. Thus, an agriculture only strategy provides good growth in employment and hence income distribution but quite poor growth in GDP.

4.4.4 Scenario IV - Accelerating Labor Force Growth to Absorb Unemployment

In the base case the price of non-tradables increases at the same rate as the wage rate (since labor is the only factor of production in the non-tradable sector). That means that in a high growth scenario the growth rate of the non-tradable sector is sharply constrained by the rising price of labor and elastic demand. That is not consistent with the analysis of the small-scale sector (Liedholm and Meade) that is always depicted as a sector with highly elastic supply. Note that in the Egypt survey (Gavian et al., 2002), the rural non-farm sector consistently reports an ability to respond to increased demand without employing additional resources, implying considerable underemployment. Such underemployment of labor is not consistent with a neo-classical model.

The effect of a pool of unemployed labor is explored in this model by assuming an underemployed labor force that becomes available over time at a rate of four percent of the total labor force each year. Thus a run is made exactly the same as the base case, but assuming the labor force grows not at 2.8 percent (CAPMAS), but at 7.8 percent. As stated previously, the current labor force growth rate of 2.8 percent per year is a reflection of the population growth rates of two decades ago, which were much higher than at present. That

allows for mobilizing unemployed labor at the rate of 5.0 percent of the total labor force, absorbing an unemployed labor force of 20 percent in 5 years. The results of this run are striking. The non-tradable sector grows at 12.5 percent. Despite the growth in the labor force the wage rate increases by 3.1 percent per year. The per capita income of the laboring class increases by 7.1 percent per year (the 4 percent rate of increase of employment in excess of the labor force growth rate of 2.8 percent and the 3.1 percent rate of increase in the wage rate.)

The rate of increase of agriculture and the non-tradable sector is greatly accelerated by rapid expansion of the labor force. That is because they are both labor intensive, compared to the urban tradable sector and in a neo-classical model factor proportions adjust to absorb an increased labor supply. As a result the wage rate rises despite the rapid growth in labor force. This result does show the high cost of rigidities in the labor market and in production technology. In the real world, rigidities of factor proportions in agriculture would not allow such rapid absorption of labor, agricultural production would not grow as quickly and the real wage rate would not rise as much.

4.4.5 Scenario V - Technological Change in the Non-Tradable Sector

A rate of technological change in the non-tradable sector of 4.0 percent may be seen as either simple technological change or as drawing in additional labor that is specific to the non-tradable sector, perhaps because of deficiencies in human capital for working in other sectors. Price of non-tradables decreases slightly by –0.02 percent, while the real wage rate rises by 3.8 percent. This is the only case in which wage rate and price of non-tradables are not the same. As a result, the non-tradable sector expands rapidly, as does the urban tradable sector. The rising wage rate draws labor out of agriculture and so the agricultural growth rate slows to 3.2 percent.

4.5 The Real Exchange Rate

Change in the real exchange rate is measured by the change in the wage rate and the price of non-tradables. Thus, a structure of growth that rapidly increases the demand for labor will cause a rise in the real exchange rate. That means that the cost of producing tradables rises and the exchange rate will have to depreciate in compensation. The domestic price of tradables will rise somewhat. That will push some consumption back towards the non-tradable sector. That effect is not measured in this model.

5. CONCLUSION

Agriculture and industry grow by quite different means. That is primarily because of very different factor shares in the two sectors. Technological change is the primary source of growth in agriculture; increased capital stock for industry. Slowing technological change in agriculture has a devastating effect on growth of incomes of the laboring class. Slowing capital investment has a similarly devastating effect on growth of GDP.

In the cases presented, eliminating agricultural growth only reduces the GDP growth rate by 12 percent. It virtually eliminates any improvement in incomes of the laboring class. It thus has a horrendous effect on income of labor, income distribution, and poverty.

By contrast, reducing capital formation to the level of the population growth rate and maintaining the high agricultural growth rate slashes the GDP growth rate by over one-third, but only reduces the rate of increase of the wage rate by 15 percent.

All these numbers are a realistic depiction of the situation if neo-classical conditions prevail. In that sense they are an ideal to which the economy should strive, but not one that will be completely attained. However, the relative relationships do hold. It is agricultures impact on the non-tradable sector that drives employment growth. And, it is technological change in agriculture, broadly interpreted, that drives the bulk of the process of employment creation.

Thus, growth does increase the income of the laboring class, but the structure of that growth, what sectors grow, is the dominant determinant of the participation of labor in the growth process. The structure of growth that benefits labor is one that has rapid growth of agriculture with its strong multiplier effect on the rural non-farm sector.

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